SERVICE MANUAL

DIRECT-DRIVE TURNTABLE (WITHOUT CARTRIDGE) PD-272

Control Circuit Operation

This control circuit works as a speed detector and is a F.G. (Frequency Generator) servo circuit which detcts as a frequency the output of the generator rotating on the same shaft as the motor. Below we will explain the operation of each circuit part.

1) F.G. (Frequency Generator)
   It is a winding and a multi-gap head with a 72 pole magnet and 36 pairs of teeth and generates a sine wave of 20Hz for 33-1/3 rpm and of 27Hz for 45 rpm.

2) Amplifier Circuit (1)
   It amplifies the F.G. output and is constructed of a 2 stage differential amplifier circuit to obtain a dual cycle 50% square wave.

   In order to double the frequency by the output of this circuit, adjust the semi-fixed resistor VR1 so the dual cycle of the square wave is 50%.

3) Frequency Step-up Circuit
   Differentiate the inverted output and non-inverted output (along with the square wave) of the above mentioned amplifier circuit and obtain a fast rising and narrow differential pulse.

   It adds each pulse to the switching transistors to get a saw tooth wave.

   Each transistor turns ON the plus side by the pulse side by the pulse and step-up (2x) of the frequency is possible.

4) Saw Tooth Wave Generating Circuit
   It consists of a charging circuit by CR and switching transistor which discharges in a short time the voltage charged in the condenser and produces a saw tooth wave having a wave heighth that is almost inversely proportional to the frequency.

5) Referenced Voltage Circuit
   This is a circuit for obtaining the voltage to determine the speed of the motor. The resistance potential makes the source voltage which is the basic voltage.

   In addition, in order to change the number of revolutions (rpm), it is constructed so the set voltage is varied continuously by/changing the potential ratio with a variable resistor.

6) Comparison Circuit

It consists of the differential comparison circuit and one switching transistor. It compares the level of the referenced voltage and the saw tooth wave shown in 4) and 5) and obtains an ON-OFF pulse. It operates so that when the height of the saw tooth wave is lower than the basic voltage it is OFF and when higher it is ON. Frequency changes (number of rotation changes) are obtained as changes of the average of the output pulses.

7) Low-pass Filer

It flattens the comparison circuit output pulses and is constructed of 2-stage CR low-pass filter.

8) Amplifier Circuit (2)

This is a circuit to amplify the voltage impressed on the Hall element by the low-pass filter output.

9) Position Detector Circuit

Position detection (detects N pole and S pole of the rotor magnet) is done by the Hall element and determines the order of current flow in the 4 drive coils.

In addition, the voltage inpressed on the Hall element/is controlled by the control circuit explained in 1) - 8) and the output voltage of the Hall element is changed in accord with the changes in number of revolutions.

10) Drive Circuit

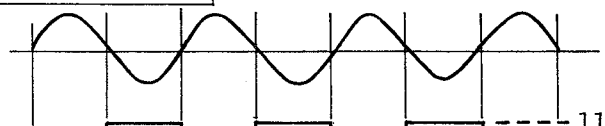
It amplifies the output of the Hall element and makes current flow in the drive coils.

11) Feedback Circuit

It provides negative feedback to the amplifier circuit (2) from the drive circuit in order to stabilize operation.

Wave Form in Each Circuit (DC 20V)

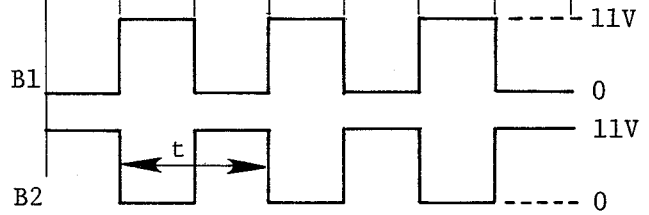
1) F.G. output



Lp 0.62Vp-p
Ep 0.84Vp-p

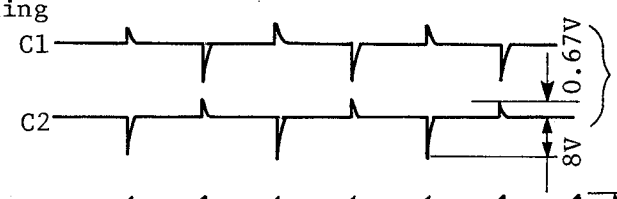
2) Amplifier Circuit (1)
Inverted output

Non-inverted output



t = 50msec(Lp)
37.04msec(Ep)

3) Frequency Doubling Circuit

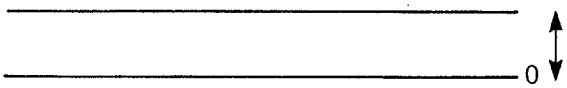


Differential output wave form

4) Saw Tooth Wave Generator Circuit

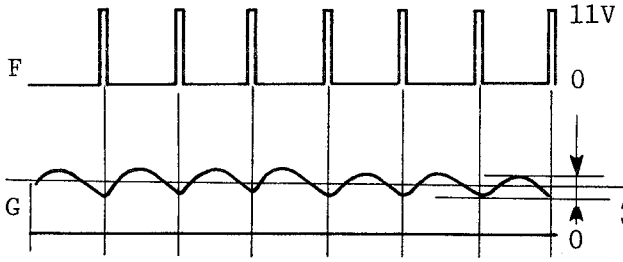
Lp;4.6V
Ep;3.6V

5) Basic Voltage



Lp;4.6V
Ep;3.6V

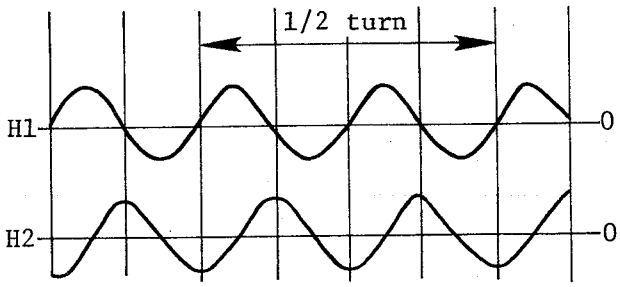
6) Comparison Circuit



7) Low-pass Filter

V=0.15V(Ep)
0.1V(Lp)

Hall element output



Approx. 0.2Vp-p

Circuit Adjustment Points

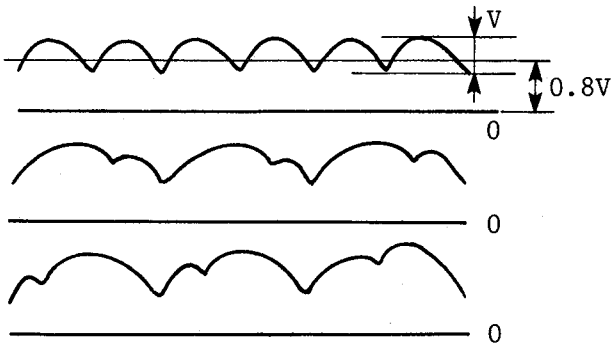
1) Adjustment of the frequency doubling circuit

Adjustment point VR_1 ..... 330ΩB

Connect a synchroscope to No. 25 pin (GND) and No. 27 pin (+).

Good wave form

Bad wave form



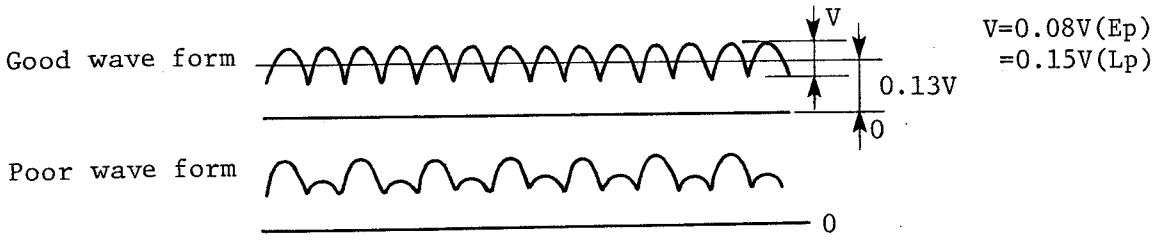
V=0.1V(Ep)
0.15V(Lp)

2) Drive Circuit Adjustment

a) Hall element adjustment

Adjustment point VR8 ..... 330Ω(B)

Connect a synchroscope to No. 25 pin (GND) and No. 28 pin (+).



b) 4 coil current adjustment

Adjustment points VR6, VR7 ... 500Ω(B)

Good wave form Same as a).

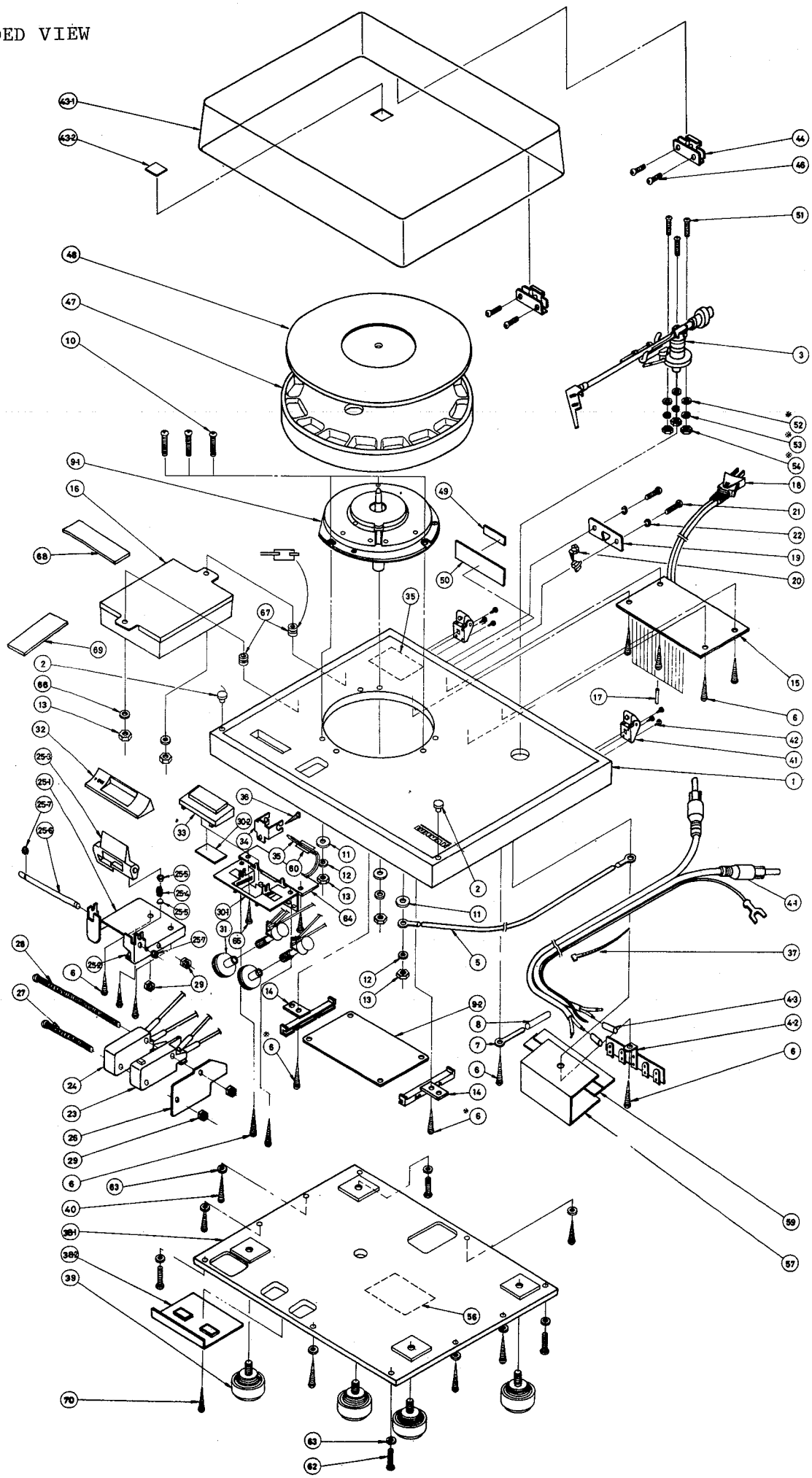
3) RPM Adjustment

Set VR4, VR5 (500ΩB) to the center and adjust to specified rpm with VR2, VR3

VR2 ... adjusts 33-1/3 rpm

VR3 ... adjusts 45 rpm

EXPLODED VIEW



1.	846565	Cabinet
2.	892766	Cushion for Dust Cover
3.	871406	Tone Arm Ass'y
4-1.	893699	Shielded Wire Ass'y
4-2.	D-10002-51	5P Lug Terminal
4-3.		Tube(Varnish)
4-4.		UL Tape UL1007 TR64 AWG22
5-1.		4φ Terminal
5-2.		3φ Terminal
5-3.		UL Cord
6.		FMW⊕ 3.1x12
7.	890755	Lug Terminal
8.		Vinyl Tube 3φx60
9.	631446	Motor DDM-507 M-2
9-1.		Motor Ass'y DDF-507 M-2
9-2.	631347	Circuit Ass'y
10.		FM⊕ 4x22
11.		FW 4.6φx12φx1t
12.		SSW 4
13.		FLN 4
14.	896179	PCB Holder
15.	871120-1	Power Supply Ass'y
16.	871363	Power Transformer
17.	702233-3	UL Tube
18.	890208-2	AC Cord
19.	893037	AC Cord Stopper
20.	891568-2	SR Bushing
21.		BM⊕ 3x14
22.		SW 3
23.	896177	Micro SW Cord Ass'y
23-1.	870560	Micro SW
23-2.		UL Cord
23-3.		UL Cord
17.	702233-3	UL Tube 3.7φx15
24.	871364	VR Micro SW Ass'y
24-1.	871391	Micro Switch
24-2.	703062	VR 500ohms-R
24-3.	871358	Connector Ass'y
24-4.		UL Cord
24-5.		UL Cord
17.	702233-3	UL Tube
25.	894168	Switch Chassis Ass'y
25-1.	870638	Switch Chassis
25-2.	894103	Spring Axle
25-3.	870637	Moulded Knob
25-4.	894075	Spring
25-5.	894076	Spring Receptacle
25-6.	893908	Switch Shaft
25-7.		EW2
26.	896175	Isolation Sheet
27.		FM⊕ 3x25
28.		FM⊕ 3x60
29.		FLN 3
30.	871366	Mirror Holder Ass'y
30-1.	871309	Mirror Holder
30-2.	896167	Reflection Plate
31.	893907	VR Moulded Knob
32.	871307	Switch Escutcheon
33.	896321	Strobo Escutcheon Ass'y
33-1.	896176	Strobo Glass
33-2.	871308	Strobo Escutcheon
34.	893905	Lamp Holder
35.	894001-3	Neon Lamp
36.		⊕Self-tap Screw
37.	894408	Wire Fastener
38.	871367	Bottom Plate Ass'y
38-1.	851312	Bottom Plate
38-2.	871310	Plate for Speed Fine Control
39.	894473	Leg
40.		FMW⊕ 3.1x16
41.	893020	Hinge Plate Ass'y
42.		BMW⊕ 3.1x12
43.	851357	Dust Cover
44.	893018	Lock Plate
45.	896288	Lock Plate Spacer
46.		FM⊕ 3x8
47.	620028	Platter
48.	871410	Platter Mat
49.	892239	Number Label
50.	896258	Number Label
51.		BsM 3x28
52.		FW 3.2φx10φx1t
53.		SW 3
54.		FLN 3

PD272

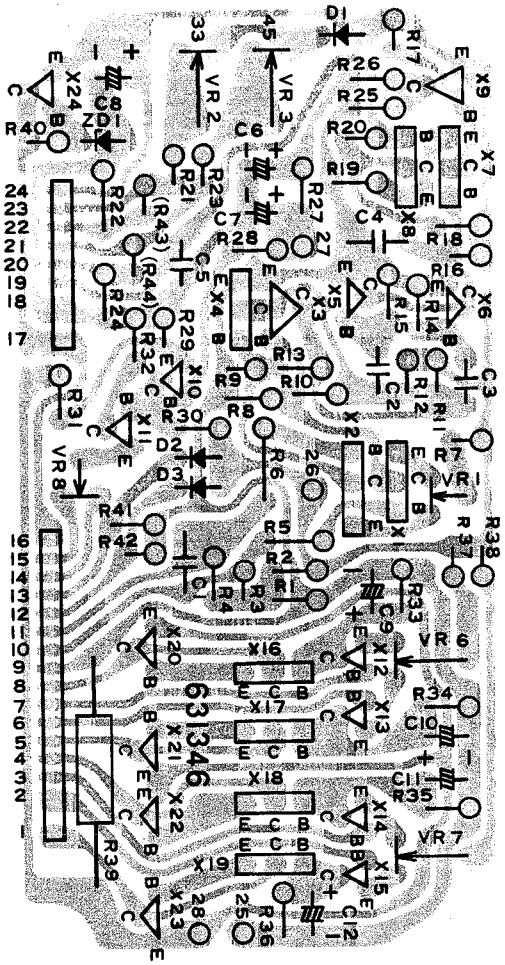
SYMBOL NO.	STOCK NO.	DESCRIPTION	LOCATION
R1		12KΩ 1/4W	
2		8.2K "	
3		220 "	
4		220 "	
5		120 "	
6		120 "	
7		12K "	
8		2.2K "	
9		2.2K "	
10		56K "	
11		2.2K "	
12		2.2K "	
13		56K "	
14		5.6K "	
15		5.6K "	
16		470K "	
17		12K "	
18		12K "	
19		22K "	
20		1.5M "	
21		4.7K "	
22		5.6K "	
23		6.8K "	
24		4.7K "	
25		12K "	
26		3.9K "	
27		33K "	
28		12K "	
29		1K "	
30		5.6K "	
31		330 "	
32		100 "	
33		22K "	
34		22K "	
35		22K "	
36		22K "	
37		2.7K "	
38		2.7K "	
39		4.7 2W	
40		2.2K 1/4W	
41		10K "	
42		10K "	
C1		0.1 50V M	
2		0.01 50V M	
3		0.01 50V M	
4		0.1 50V M	
5		1 16-50V E	
6		1 16-50V E	
7		0.47 16-50V E	
8		100 25V E	
9		1 16-50V E	
10		1 16-50V E	
11		1 16-50V E	
12		1 16-50V E	

M; mylar film
E; electrolytic

SYMBOL NO.	STOCK NO.	DESCRIPTION	LOCATION
VR1		330 (B)	
2		5K (B)	
3		5K (B)	
4		500 (B)	
5		500 (B)	
6		500 (B)	
7		500 (B)	
8		330 (B)	

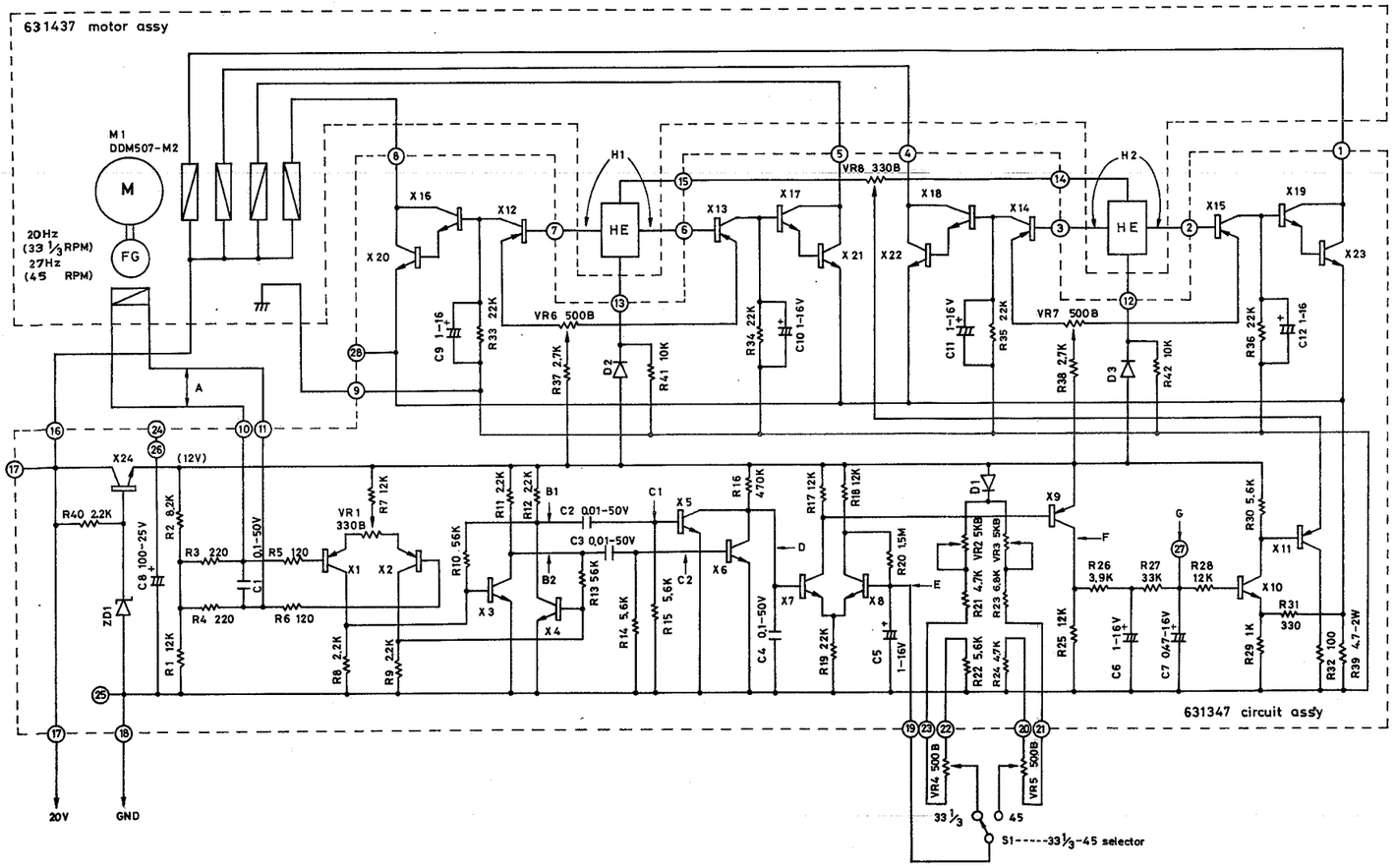
Semiconductors

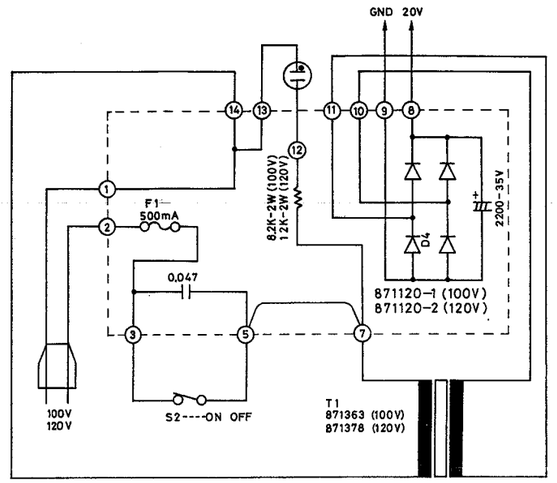
X1, X2, X9 ..... 2SA641, 2SA842 or 2SA564
X3∿X8, X10, X16∿X19 ..... 2SC945, 2SC733, 2SC1815 or 2SC828
X12∿X15 ..... 2SA733 or 2SA561
X20∿X24 ..... 2SD571 or 2SC1384
X11 ..... 2SB605, 2SA684 or 2SA886
D1 ..... MV203V
D2, D3 ..... 1S953, 1SS53 or MA150
D4 ..... SIRBA10
ZD1 ..... RD13E(B) or MA1130

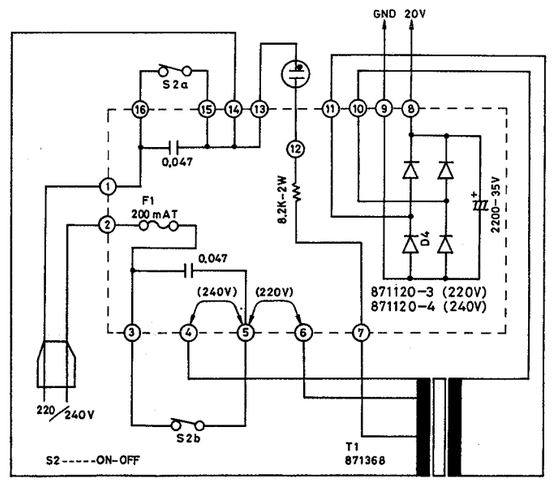


SPECIFICATIONS

[Phono Motor Section]	
Driving System:	Direct-Drive System
Motor:	DC-servo brushless & slotless motor
Turntable Platter:	30cm aluminium die-cast (weight 1.8kgs including platter-mat)
Rotation:	33-1/3 rpm, 45 rpm (2-speed)
Adjustable Range of Rotation:	±4%
S/N Ratio:	No less than 60dB (IEC-B)
Wow & Flutter:	no more than 0.03% W.R.M.S.
[Tonearm Section]	
Tonearm:	Straight Arm of static balance type
Effective Length:	240mm
Tracking Error:	+2°13′, −1°08′
Overhang:	15mm
Cartridge Weight:	4g – 11g
Cartridge Height:	13.5mm – 20.5mm
Stylus Pressure:	0 – 3g (direct reading)
Accessories:	Anti-skate Adjustment, Tonearm Elevation
[Additional Features]	
Dust Cover:	Detachable with semi-freestop hinge
Insulator:	Height adjustable
Stroboscope:	Mirror-reflex type.
[General]	
Power Consumption:	5W
Dimensions:	472(W) x 152(H) x 348(D)mm (18-37/64″ x 6″ x 13-45/64″)
Weight:	Net 10kgs (22 lbs.) Gross 12kgs (26.4 lbs.)







X1, X2, X9 ----------2SA641, 2SA842 or 2SA564
X3~X8, X10, X16~X19-------2SC945, 2SC733, 2SC1815 or 2SC828
X12~X15 ----------2SA733 or 2SA561
X20~X24 ----------2SD571 or 2SC1384
X11 ----------2SB605, 2SA684 or 2SA886
D1 ----------MV203V
D2, D3 ----------1S953, 1SS53, MA150 or 1S1555
D4 ----------S1RBA10
ZD1 ----------RD13E(B) or MA1130

1. Unless otherwise specified, all resistors are in ohm 1/4 watt, all capacitors are in micro-farad.
2. Transistors and diodes may be replaced with any types having comparable ratings.
3. Due to continued improvements LUX reserve the right to alter the circuit or specification.

PD272